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Boklund, Anette ; Hisham Beshara Halasa, Tariq; Christiansen, Lasse Engbo; Enøe, Claes

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Comparison of different control strategies on FMD in Denmark

A. Bokund[1], T. Halasa[1], L. Christiansen[2], C. Enøe[1]

[1]Section for Epidemiology, National Veterinary Institute, Technical University of Denmark
[2]Mathematical statistics, Department of Informatics and Mathematical Modelling, Technical University of Denmark

The purpose of this study was to compare different control strategies that could be used in Denmark during an outbreak of FMD, based on epidemiological, ethical and economic parameters. Nearly a hundred different control strategies and more than 30 sensitivity analyses were run, changing between depopulation (Depop), suppressive (VacToKill) and protective (VacToLive) vaccination with different times for implementation and different zone sizes. It is therefore obvious that not all results can be included here; neither will all results be presented at the seminar. However, we have done our best to extract the essence of the results. All results will be presented in the final project report, which will be available on request to the authors.

Comparing epidemiological outputs showed that extra control measures will always reduce the average duration and size of an epidemic. However, the variations in duration and size of epidemics are large, and if epidemics are small, extra control measures may not always be necessary. Comparing depopulation to suppressive and protective vaccination shows that from an epidemiologic point of view, vaccination will be beneficial. However, comparing the economy of the epidemics, it is shown that vaccination is more expensive compared to depopulation.

Results from 1000 epidemics starting in **cattle herds** in cattle **dense** areas. Epidemiological results from ISP presented as medians and 5-95 percentiles (brackets), economical as means.

Simulated scenario	Zone	Epidemic duration (days[1])	Detected herds	Depopulated herds	Vaccinated herds	Av. costs and losses (mill. €)
Basic	-	80 (5-255)	119 (2-598)	141 (3-718)	-	703 (399-1137)
Depop. 14days	500 m	66 (5-184)	94 (2-401)	175 (3-806)	-	634 (398-948)
	1000 m	48 (5-122)	68 (3-270)	205 (3-862)	-	**565** (393-783)
	1500 m	42 (5-107)	62 (2-247)	284 (3-1219)	-	566 (393-800)
VacToKill, 14 days[2]	1km	59 (5-141)	81 (2-318)	96 (3-383)	160 (0-711)	588 (400-803)
	2km	49 (5-110)	64 (2-257)	78 (3-318)	339 (0-1445)	579 (427-774)
	3km	47 (5-104)	63 (2-232)	78 (3-281)	637 (0-2362)	563 (413-727)
	5km	46 (5-94)	62 (2-229)	74 (3-273)	1311 (0-4672)	577 (428-739)
VacToLive, 14days	1km	53 (5-125)	70 (2-265)	84 (3-317)	135 (0-601)	647 (470-858)
	2km	46 (5-97)	58 (2-226)	72 (3-274)	305 (0-1246)	615 (469-773)
	3km	42 (5-87)	54 (2-199)	66 (3-242)	499 (0-1822)	606 (472-755)
	5km	**40 (5-81)**	**48 (2-177)**	**59 (3-216)**	**932 (0-3375)**	602 (473-746)

[1]Epidemic duration calculated from day of first detection to the last herd is detected.
[2] Suppressive vaccination – it is important to keep in mind that vaccinated animals will be slaughtered after the epidemic, and therefore must be added to the depopulated animals.

The size, duration and costs of epidemics vary much with the type of index herd (starting points). Furthermore, not only economy, but also ethical and political issues will also play an important role in decision making. Therefore, it is important to keep in mind that this work will not give the answer as to which strategy to use during an epidemic, but can be used as a decision support tool. Sometimes, even though one strategy will be predicted to be cheaper, the second cheapest strategy might reduce the number of killed animals so much that it will become a better option.